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Mosquito Management

The latest
technology,
trends and
techniques

People have been studying mosquitoes for centuries. The technology and techniques available to combat these disease-carrying vectors have improved enormously throughout the past several decades. The 80th American Mosquito Control Association annual meeting was held last month in Seattle. Here's a look at the latest issues facing the mosquito management industry.



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Word From Our Sponsor



Mosquito Bites Mean New Revenue Sources for PMPs

By Curtis Clark

Considered the most dangerous animals on Earth, mosquitoes are threatening to man. Every year, diseases spread by mosquitoes cause more than 1 million deaths. In the United States alone, millions of dollars are spent annually to eradicate them.

There are almost 3,000 species of mosquitoes. The Southern house mosquito (*Culex quinquefasciatus*) is probably the most-common species in the U.S., but the Asian tiger mosquito (*Aedes albopictus*) and common malaria mosquito (*Anopheles quadrimaculatus*) are also prevalent. Any of these can carry the West Nile virus (WNV), yellow fever and malaria.

Disease is spread when the mosquitoes feed on blood. Usually, only female mosquitoes feed on blood; most males feed on plant nectar. Large mammals, like humans, are the host of choice. Females need the nutrients in blood before they can lay their eggs. The typical female mosquito can live for two to four weeks as an adult, laying as many as 300 eggs at a time. From one female mosquito, in one season, more than 4 million others will descend. (Imagine that family reunion.)

The American Mosquito Control Association

(AMCA) warns WNV might be only the first in a series of imported, exotic diseases, thanks largely to the uptick in ecotourism and international air travel. Other undesirable visitors — namely malaria, Rift Valley fever, Chikungunya virus and dengue fever — could be grabbing a flight any day.

Consequently, the necessity for mosquito management is gaining traction, extending well beyond a quality-of-life issue. Increasing tourism and trade present challenges and opportunities for those prepared to manage mosquito populations and the spread of these dreaded diseases.

Offering mosquito management services that complement municipal mosquito abatement could greatly benefit municipalities struggling with reduced budgets and further position pest management professionals (PMPs) as trusted guardians of public health. Simultaneously, we can enhance our image as critical pest-problem solvers for our residential and commercial end users.

Bottom line: By jumping in early, PMPs can enjoy a new revenue stream in a rapidly expanding market with little competition.

“Infectious diseases are spreading geographically much faster than at any time in history.”

— Margaret Chan, M.D.,
Director-General, World Health Organization

Control Solutions Inc. (CSI) offers a complete line of professional vector control products. Numerous formulations contain active ingredients of permethrin, pyrethrins, piperonyl butoxide and chlorpyrifos. CSI has the tools professionals need to engage in an open market. Contact a local distributor, or visit www.controlsolutionsinc.com, for more information.

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The Buzz about Mosquitoes

PMPs discuss the latest trends in their growing mosquito management services.

Mosquito management accounts for a relatively small part of many pest management companies' revenue, but it's one of the fastest growing divisions for many.

Tony Linhares, manager of the mosquito and lawn care division of Killingsworth Environmental of the Carolinas, has seen his mosquito business increase 20 percent a year for the past several years.

It's part fear of West Nile virus (WNV) and the fact the economy has forced more people to remain home instead of traveling for their vacations that created the uptick in mosquito treatments.

Dennis Jenkins, owner of Dallas-based ABC Home & Commercial Services, generates between \$300,000 and \$400,000 each year from mosquito work.

"It's a great add-on service," Jenkins says.

In 2012, the Dallas-Fort Worth area experienced a significant increase of WNV cases, which increased customer awareness, Jenkins said. That awareness led to an increase of mosquito work. In 2013, Jenkins tested backpack sprayers on nine of his 60 vehicles. This year, ABC has backpack sprayers on all 60 trucks. Before using sprayers, he spent time using misting systems and organic solutions. While he still uses an organic insecticide if someone requests it, the ratio is 10:1 in favor of the backpack sprayer approach for ABC.

While awareness of WNV has increased, Jenkins refuses to play on customer fears. At the same time, the last thing he wants to have happen is be sued by a customer who might contract a disease because he didn't



A Palmetto Mosquito Control technician uses a backpack blower to treat for mosquitoes.

offer as aggressive an approach as possible. Jenkins makes it clear any mosquito abatement program isn't a guarantee customers will never see a mosquito again. Customers must play a role in the process by eliminating standing water and understanding their neighbors might not be as diligent. After all, mosquitoes can sense carbon dioxide from humans from several hundred feet away and detect human odor 100 feet away.

"If you're going to get into this business, don't do it without a mosquito management contract," Jenkins says. "We can't guarantee the absence of mosquitoes."

Technicians must play the key role of liaison with the customer. They must pay attention to standing water around the property and explain why it's so important to

A misting system helps treat a customer's South Carolina home.





A Palmetto Mosquito Control technician uses a backpack sprayer to treat for mosquitoes.

get rid of even the smallest amounts.

“They can’t just blow and go,” Jenkins says about techs. “They’ve got to get into the customers’ heads. This has to be cooperative, or it shouldn’t be done. Customers are the ones who are going to encounter mosquitoes, and then they’ll hold you responsible.”

For Linhares, dealing with standing water is imperative. There are some situations in which customers will have standing water repeatedly. When that’s the case, Killingsworth technicians will add a larvicide to the site to try to prevent the mosquitoes from becoming adults.

There are 61 different mosquito species in the state of South Carolina, according to Derek McLaughlin, manager of Palmetto Mosquito Control in Charleston. But there are basically two that cause problems: the black salt marsh mosquito (*Aedes taeniorhynchus*), which is active before dusk and dawn; and the tiger mosquito (*Aedes albopictus*), which is more active during the day. While most mosquitoes never travel much farther than a mile or so from where they’re hatched, salt marsh mosquitoes can travel as far as 40 miles.

Treatment strategies

Palmetto Mosquito Control offers misting systems and barrier control. The misting systems are more expensive to install (starting at \$2,000), and most can be monitored and refilled with product as needed. Still, they can be effective. Also, the barrier treatment, which is becoming more popular, is available in two different forms, including a backpack blower or a power spray using a hose.

“Power spraying is a bit more labor intensive,” McLaughlin says. “But it works a little better, and you don’t have as much drift with a backpack blower. We use the backpack blower for bigger yards.”

The push toward green has settled compared a couple years ago, but the company still receives requests from customers asking about environmentally friendly mosquito management. To that end, the misting system is effective with cedar oil as a deterrent. It’s a sound alternative for homes near bodies of water.

The rise in WNV cases has been a concern for some Palmetto customers, but that’s not their main concern or problem.

“We have customers worried about disease, but for the most part it’s a matter a comfort,” McLaughlin says. “They want to be able to eat outside or have the kids play in the yard ... without being pestered by mosquitoes.”

Like ABC Home & Commercial Services and Killingsworth, Palmetto has experienced an increase of mosquito management revenue — up 32 percent last year and 26 percent this year.

The specter of WNV is one reason many people add mosquito management to their list of pest management services. Fortunately, PMPs have numerous solutions. But as with any tool, it must be matched properly with the problem. Weather conditions and location — especially the proximity to water sources — play a key part when deciding the proper pesticide application. Educating the customer is one of the most important parts of that process. **PMP** — **Dan Jacobs** | Contributor

A Palmetto Mosquito Control technician treats a yard with a power spray.





Of the **People**, by the **People**, for **Themselves**

Gridlock in Washington, D.C. means proponents of change are having a hard time getting their message through Congress.

Almost every time Congress passes legislation, someone or some group, somewhere cringes. Sometimes maintaining status quo is a good thing, but that's not the case when pest management-supporting groups are working to pass legislation to support the industry.

According to Kam Quarles, director of legislative affairs in the law firm of McDermott Will & Emery LLP, the past two or three Congresses and the public have been locked in a vicious cycle of voter anger, volatile elections and turnover. And now that the President is serving his second term, the House and Senate are focusing on themselves — which means they're unlikely to even vote on, let alone push through, any legislation that will upset part of their constituencies.

NPDES Coalition

The National Pollutant Discharge Elimination System (NPDES) Coalition is a broad group representing both public health organizations and production agriculture. Among the groups represented are the American Mosquito Control Association (AMCA) and CropLife America, which is affiliated with Responsible Industry for a Sound Environment (RISE). The NPDES Coalition has been lobbying the House and Senate on the Farm Bill about NPDES and U.S. Federal Insecticide, Fungicide & Rodenticide Act (FIFRA) clarification language (HR 935) that was included in the original and rewritten House bills.

"To ensure the fix was included, the Senate would have to agree to the House (bill) or a vote of the conference would need to be held," Quarles says. "Coalition members spent months canvassing conferees to ensure the votes were there. Ultimately, the conference never held a formal meeting, so no votes could take place about various regulatory issues including the language."

“In this present crisis, government is not the solution to our problem; government is the problem.”
— President Ronald Reagan

Congress' inability to act doesn't mean the NPDES Coalition is giving up. Many members are hopeful another legislative vehicle can be found to which the appropriate language can be attached.

Mosquito management product registrations

Using a football metaphor (his AMCA presentation came the day after the Seattle Seahawks won the Super Bowl), Karl Malamud-Roam explained the state of mosquito management product registration. He outlined who's on the team, who the opponents are, the right game plan — and who needs to hang up their cleats.

"We need to think more broadly about the vector control toolbox," Malamud-Roam says.

The game plan for bite avoidance involves more than just chemical treatment. Exclusion and repellents, among other factors, are all issues pest management professionals (PMPs) must consider. PMPs also must look at vector prevention and reduction strategies.

At press time, there were 1,568 registered products in the United States that have mosquito as part of their labels. When you add minimum-risk 25(b) products to the list, that number increases considerably. There are also between 81 and 89 registered active ingredients (depending on how they're counted) with known mosquito-use properties, and nine area-wide adulticides.

The U.S. pest management industry has numerous teammates in the fight against mosquitoes, according to Malamud-Roam. Those teammates include herbalists and traditional wisdom, the military, universities, philanthropy, agrichemical companies, other countries, industry collaborators, regulators, the World Health Organization, foundation funders, the Deployed Warfighter Protection Program, the President's Malaria Initiative and the Innovative Vector Control Consortium (IVCC).

And there are a number of new players ready to join the fight, including new formulations and active ingredients.

"Be optimistic, things are coming," Malamud-Roam says, pointing to natural products, and new use patterns and tactics, among other solutions. **PMP** — **Dan Jacobs** | Contributor





Issues of the Day

AMCA members discuss how their organization should address invasive species and NPDES.

It's not often the collective wisdom of thousands of years of industry experience and knowledge comes together to solve problems. Conferences are one of the few places where that happens.

During the 80th annual American Mosquito Control Association (AMCA) conference in Seattle last month, a group of mosquito control professionals (MCPs) put their combined expertise to several problems facing the industry. Attendees took part in roundtable sessions to discuss how to deal with the invasive species issue and the diseases they bring. The group also explored whether its lobbying arm should continue to pursue favorable wording regarding the National Pollutant Discharge Elimination System (NPDES) permitting requirement of the U.S. Clean Water Act (CWA).

NPDES

An AMCA position paper states: "Due to a court ruling in 2009, [the U.S. Environmental Protection Agency, or EPA] and the states have instituted NPDES permits for the application of mosquito control pesticides. EPA issued its General Pesticide NPDES permit on October 31, 2011. The authorized states have issued similar permits. The failure to obtain and comply by such a permit can subject MCPs to costly litigation through the citizen suit provisions of the CWA."

Angela Beehler, District Manager of the Benton County Mosquito Control District in West Richland, Wash., led the discussion by explaining the state of the issue.

"If you're putting a larvicide or adulticide where it's considered a point source discharge and near waters of the U.S., you need a permit," she says, adding the AMCA

legislative and regulatory committees "wanted to say that one no longer needs permits, but that didn't happen. Because the jobs and permitting is difficult, are we getting that message to the people who make the laws? Restrictions don't usually get easier."

Beehler asked the attendees whether they want the AMCA continue to press the issue: "What's the burden on your district?" she asked. "How much have you paid? What type of equipment do you need? What's the burden on your organization tied to NPDES permitting?"

Attendees discussed the issue before approaching microphones to express their thoughts.

One attendee said that in California, it's extremely expensive to comply with the NPDES permitting requirement because it takes three to four people several weeks to complete all the paperwork. There's also a water quality-testing requirement.

Dr. Roger Naschi, chief of the Arboviral Diseases Branch in the Division of Vector-Borne Diseases at the Centers for Disease Control & Prevention (CDC), played devil's advocate, suggesting that abiding by minimum requirements isn't bad. It's worth the investment.

The issue is the concerns addressed by NPDES are already covered in other legislation. So MCPs are being doubly regulated.

It's not a bad thing to monitor water quality but the amount of work it takes is unreasonable, said another attendee. Perhaps there's a compromise somewhere in between.

There might be a need for the regulation, but considering the absence of data, that regulation might be unnecessary, said an attendee.

Beehler asked whether the AMCA should continue its fight regarding NPDES language. She asked for a vote of hands, and the issue was decided when almost every hand in the room raised.

Continued page 10



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CSI's Mosquito Management Arsenal

CSI 4-4 and CSI 30-30 Mosquito, Fly and Gnat Control are synthetic pyrethroid vector control insecticides, new from Control Solutions Inc. (CSI). The low odor and non-corrosive formulations contain permethrin, which attacks the insect nervous system, and piperonyl butoxide, a synergist that delivers quick knockdown and effective control.



Features include:

- Active ingredients: permethrin, piperonyl butoxide;
- Designed for ultra low volume (ULV) and thermal fogging applications;
- Quick knockdown, long-lasting residual; and
- Kills mosquitoes that carry and transmit West Nile virus (WNV).

VECTOR-BAN PLUS is a water-based insecticide designed for use in automatic mosquito misting systems, which also can be used in various other applications, such as treating mattresses for bed bugs. Features include:

- Can be used in warehouses, homes; livestock housing facilities, milking parlors, poultry houses and residential yards;
- Formulated for automatic misting systems, outdoor band applications, indoor broadcast,



crack and crevice, ULV, space spray and animals listed on the label;

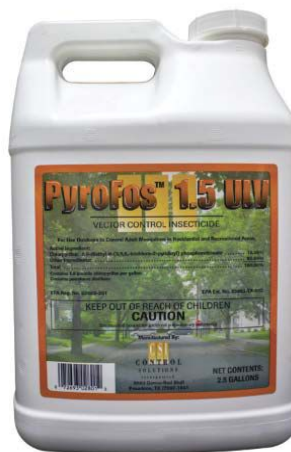
- Controls mosquitoes that transmit the West Nile virus (WNV), flies, gnats, wasps, fleas, cockroaches, bed bugs, spiders and many other nuisance pests; and
- One-half gallon of concentrate makes as much as 55 gallons for automatic spraying systems.

PyroFos 1.5 ULV is recommended for application as a thermal fog or as an ultra low volume (ULV) non-thermal aerosol application to control adult mosquitoes

in outdoor residential and recreational areas and other non-cropland areas with conducive conditions.

Features include:

- Active ingredient chlorpyrifos, used for more than 30 years for various types of integrated pest management programs;
- PyroFos 1.5 ULV, effective on species of mosquitoes that are resistant to synthetic pyrethroids; and
- Ideal choice for low-budget abatement programs.



PYSTOL Misting Concentrate contains 0.55% pyrethrins, 5.50% piperonyl butoxide and 1.10% permethrin.

Features include:

- For use in automatic misting systems in barns and outdoor residential yards;
- Mixes with water to make as much as 55 gallons of solution for misting systems; and
- Kills and repels mosquitoes as well as house, stable, horse, black, deer, fruit and horn flies, gnats, bolt flies, biting and nonbiting midges, face flies and fleas.





STRYKER Insecticide Concentrate

This multi-purpose, quick-kill insecticide is for use in and around residential buildings and structures, and on ornamentals, bushes, flowers, fruit and nut trees, shade trees, vegetables, roses, directly on

animals and other livestock.

Features include:

- Wide-area adult mosquito control;
- Kills cockroaches, bed bugs, biting flies, fleas, ants, silverfish, stink bugs, spiders and many other insects in addition to mosquitoes;
- Formulation: multi-purpose concentrate (active ingredients: 6% pyrethrins, 60% piperonyl butoxide); and
- Can be applied through mechanical aerosol or ULV generators including thermal fogging equipment.

Mosquito-Borne Diseases & Viruses

Mosquitoes cause more human suffering than any other organism. Worldwide, more than 1 million people, mostly children, die from mosquito-borne diseases every year.

Not only can mosquitoes carry diseases such as West Nile virus (WNV) and Eastern equine encephalitis (EEE) that afflict humans, they also transmit these diseases to horses, in addition to parasites such as dog heartworm. In addition, mosquito bites can cause severe skin irritation through an allergic reaction to the mosquito's saliva, the cause of related red bumps and itching.

Mosquito-vectored diseases include: protozoan diseases such as malaria; filarial diseases such as dog heartworm; and viruses such as dengue, encephalitis and yellow fever. Following are just nine of the top mosquito-borne diseases and viruses:

- **Malaria**
- **Dog heartworm**
- **Dengue**
- **Yellow fever**
- **Eastern equine encephalitis (EEE)**
- **St. Louis encephalitis (SLE)**
- **La Crosse encephalitis (LAC)**
- **Western equine encephalitis (WEE)**
- **West Nile virus (WNV)**

Source: The American Mosquito Control Association's (AMCA's) website, www.mosquito.org



West Nile virus (WNV) timeline

1937

West Nile virus (WNV) originates in Africa.

1999

WNV first appears in North America (in New York) with 62 confirmed cases; seven humans and nine horses die.

2001

Sixty-six human cases (10 deaths) are reported in 10 states. WNV occurs in birds or horses in 27 states and Washington, D.C.; Canada and the Caribbean.

2002

Forty-four states and five Canadian provinces report cases of WNV. The only states not reporting WNV in 2002 are Alaska, Arizona, Hawaii, Nevada, Oregon and Utah. In all, more than 3,800 human cases with 232 fatalities in 39 states and Washington, D.C., are recorded. More than 24,350 horse cases of WNV were confirmed or reported.

2003

The final Centers for Disease (CDC) report on WNV lists more than 9,858 cases: 6,829 are West Nile fever (the milder form); 2,863 are neuroinvasive (the more severe form); and 166 are clinically unspecified.

2004

In the United States, more than 43 species of mosquitoes tested positive for WNV transmission.

As of 2014

Centers for Disease Control (CDC) received reports of 36,437 cases of WNV. Of these, 15,774 resulted in meningitis/encephalitis and 1,538 were fatal. CDC estimates there have been at least 1.5 million infections (82% asymptomatic) and 350,000 cases of West Nile fever; the disease is grossly under-reported because its similarity to other viral infections.

Source: The American Mosquito Control Association's (AMCA's) website, www.mosquito.org



Issues of the Day Continued from page 7

Invasive species

Steve Mulligan, district manager of the Consolidated Mosquito Abatement District, in Selma, Calif., asked attendees to answer questions about invasive species:

- Can we develop response plans?
- What are the best surveillance tools we need?
- How can we get information to those who need it?
- What are the best strategies to combat these blood-sucking pests?

In the mosquito and vector control world, organizations need to parse their operating budgets so 25 to 30 percent is available for emerging vectors, Mulligan said. That can be difficult when these public entities already have tight budgets and other financial pressures.

To help make response plans to common problems happen, one attendee suggested, it would be good to have a database of where certain problems exist. That way, when an invasive species appears, the proper resources can be identified — and those who've been through a problem can be a resource for another area facing the same problem.

With tongue partially in cheek, another MCP suggested the creation of a swat team — an emergency group that responds to new outbreaks.

Everyone agreed it's essential to share resources, especially maps that indicate outbreaks.

MCPs need as much help as they can get. The problem with many of the exotic diseases invasive species bring (West Nile virus, Dengue fever, yellow fever, etc.) is many physicians don't recognize the symptoms. They're not trained to diagnose or identify exotic diseases — information that might help stem outbreaks.

Finally, one attendee suggested that when invasive species are found, an information packet should be sent to instruct people in the danger zone about what to do.

Exotic diseases and viruses

When exotic species appear, they sometimes bring exotic diseases with them. Many Americans have heard of West Nile virus (WNV); fewer perhaps are familiar with Dengue fever. But other illnesses could be on the horizon, including Chikungunya, Japanese encephalitis and Rift Valley fever.

Nasci encouraged attendee feedback about whether the industry has adequate tools to monitor and control the mosquitoes that bring disease. Receiving a response in the negative, he followed up with: "What's lacking?" and "What additional tools are needed?"

It's a different issue than simply eliminating the pests, or as one attendee put it: "We can kill the crap out of mosquitoes."

Rather, in all sorts of areas, the lines of communications are broken, one participant said. Resources need to be provided to support communication.

For example, doctors, when they encounter a disease such as Dengue fever, treat the symptoms. There's no requirement to report it to the CDC. One attendee related how in Key West, Fla., an invasion was swept under the rug because the local officials didn't want it to affect tourism negatively.

The tools to detect new diseases are adequate, one attendee argued, but more training for doctors is necessary, and communication is key.

Other recommendations included:

1. Send probes or primers to high-risk areas, so they can test for those diseases.
 2. Curtail the loss of mosquito abatement districts.
 3. Emphasize the cost of treatment to the public.
- Point out how it's far more expensive to pay the cost of treating those infected with these diseases than it would be to fund preventive measures. **PMP**

— **Dan Jacobs** | Contributor



Two Paths to the Top

Working together, PMPs and AMCA members can accomplish a common goal.

Joseph Conlon is the first and only technical advisor the American Mosquito Control Association (AMCA) has ever had. For the past 14 years, Conlon has been working with the organization that traces its roots to 1935 — even farther depending on how one looks at the history.

Before joining the AMCA, Conlon spent 20 years as a Navy entomologist, studying malaria and working with Marines in 37 countries throughout the world, including Africa and the Middle East. He has a master's degree in medical entomology and parasitology from Bowling Green State University in Ohio and a master's degree in secondary science education from Old Dominion University in Norfolk, Va. He has published 27 papers in peer-reviewed scientific journals and more than 130 articles in various trade magazines and major newspapers. He has testified before the U.S. Congress twice about the role of mosquito management in West Nile virus (WNV) control.

While a graduate student at Bowling Green, Conlon oversaw the Wood County mosquito abatement program, which hooked him. He recalls the day he found his first pool of *Aedes vexans* (or reincarnated politicians, as he jokingly calls them).

"It was about 100 square feet in a field of grasses," he says. "It was black with mosquito larvae. I had a mosquito laravaciding oil, and you could watch them suffer as they asphyxiated. They weren't going to be mosquitoes that would grow up and feed on me."

Conlon believes the AMCA and pest management professionals (PMPs) can work together better to reach their common goal of improving public health. He admits AMCA members, the majority of whom are members of mosquito and vector control districts, haven't always looked kindly on their PMP cousins. But that can and should change.

"We need to know each other's strengths and weaknesses so we can dovetail and help the public," he says. "We'll be surprised and gratified — and the American public will be better for it."

One of the challenges is many mosquito and vector control districts, which are mostly government agencies, look at PMPs as only moneymaking entities.

"The vector control community doesn't want to be sucked into that and are reluctant to be associated with them," Conlon says. "They don't understand the technical expertise, which is substantial. I don't consider (PMPs) as opponents or that we're in competition. We need to provide a mechanism so we can leverage each other's strengths."

However, the common difficulties the two groups face are greater than their differences, Conlon says.

"Both of our professions are under continual challenges," he says. "The regulatory pressure reducing the number of products we have at our disposal is alarming. It's limiting the ability to implement integrated mosquito management."

Another common objective of the groups is education. The AMCA is considering developing an accreditation program for mosquito control. The format of accreditation and the logistics of the management process are being discussed, and the final form is likely a couple years away; but whenever it comes into being, Conlon would love to have PMPs seek the accreditation.


"It would level the playing field," he says.

Conlon has spoken to groups such as the National Pest Management Association (NPMA) and is available for speaking engagements for other industry groups. He also encourages PMPs to join the AMCA to leverage everything the organization offers.

"The AMCA welcomes a dialogue," he says. "Let's see what capabilities one another has. Let's see what standards mesh. There's a need for people who don't have a vector control district. They're looking for relief, and PMPs are the best ones out there for that."

"I see it as a win-win," he says. "The more intimate contact we get, the better off we all are." **PMP**

— **Dan Jacobs** | Contributor



Joseph Conlon,
technical advisor for the
American Mosquito Control
Association (AMCA)



The Future Workforce

Involving students in hands-on science could help raise the next generation of PMPs.

Aedes albopictus means little to the average person, but to several hundred schoolchildren in the San Gabriel Valley town of El Monte, Calif., it could mean a future in etymology. At the least, it can be translated into an exciting, hands-on citizen science project.

Kelly Middleton, public information officer for the San Gabriel Valley Mosquito & Vector Control (SGVMVC) District, spoke at the American Mosquito Control Association's (AMCA's) annual meeting last month about how the organization tapped into the local school district to get a handle on *Aedes albopictus*, commonly known as the tiger mosquito, when the striped bloodsucker invaded the area in 2012. Like many government agencies, the SGVMVC district didn't have the manpower nor the money to cover the city to see how much of it the mosquito had invaded. Instead, it enlisted the help of the 28 schools in and around El Monte.

"We were concerned about what was going on in the areas because they hadn't had a chance to send staff out there," says Middleton, adding there was a concern the

prevailing winds were pushing the mosquitoes through more of the community than the area in which they were found initially.

El Monte is a large area with a dense population — more than 115,000 residents on 32,750 parcels. About 85 percent of residents don't speak English. In essence, the district deputized the students of the 28 schools to become vector inspectors to do surveillance work.

The program began with assemblies at all the schools, where the mosquito and vector control officials showed a video that explained how students could look for standing water, identify larvae and adults, collect samples and return them to their schools, where district officials could collect and test them. The district created thousands of kits that were distributed to the students. The kits included a data sheet, collection containers and eyedroppers for sampling standing water.

A presentation was made to about 7,500 students, of whom 2,006 participated in the deputized vector inspectors program. The district received about 1,500 kits back to study. As might be expected, not everything collected was mosquito related. A few spiders, a cockroach, carrots and grapes were among the findings. Despite the anomalies, a lot of important data was uncovered. The collections were conducted in the spring and fall of 2012.

"They did a great job," Middleton says. "None of them came back with *Aedes albopictus* larvae (in the spring). We were looking in areas around our known infestations, so maybe it wasn't a bad thing."

During the fall collection, the students found tiger mosquito larvae. One of the additional program benefits was educating the children's families about how to protect themselves from mosquito infestations. The students and their families learned about the importance of eliminating standing water sources around their homes.

The program cost the mosquito and vector control district \$18,900, which included video animation (\$6,500), seasonal staff (\$2,300), a projector (\$1,500), kit supplies (\$7,600) and printing (\$1,000). **PMP**

— **Dan Jacobs** | Contributor



Tiger Mosquito, *Aedes albopictus* and larvae

Steer Clear of Accidents

Fleet-tracking technology, coupled with old-fashioned reminders, can yield significant returns.



Dave McLaughlin

The problem with common sense — such as fleet management safety — is it's not so common. For example, pest management business owners who think their employees on the road are following the rules and driving safely because it makes sense

could be in for a rude awakening. There are three good reasons to care about your employees' driving habits: safety, cost and environmental impact. But too often, business owners use the say-and-pray method, says David McLaughlin, director of marketing with Clarke, an environmental products and services company.

Fleet management is more important than just tuning up vehicles. Five basic steps to a safer driving workforce are:

- 1. Background check.** Anyone with a history of driving problems isn't likely to drive for Clarke.
- 2. Policies.** That could mean no cell phones and having drivers pay for traffic tickets or red light camera violations.
- 3. Comprehensive training.** This includes setting expectations; reminding employees about certain laws, such as distracted driver laws and school zones;

reviewing the vehicles before driving, such as checking mirrors, walking around the vehicle, and making sure the spill containment kit is in place. "You should do this every day," McLaughlin says. "It's important to make sure everyone knows accident protocol — who to call if something happens."

4. Maintained vehicles. While McLaughlin says most companies do a thorough job of this, keeping vehicles in top shape ensures they're achieving the best fuel mileage.

5. Monitor. Clarke uses a company called GeoTab, which monitors every vehicle. The device tracks speed, idling time, quick acceleration, sudden braking and fuel efficiency. It also provides location tracking. The device can even report how much driving is done after business hours. It's all done in real-time.



The information can be downloaded into reports, and drivers can be scored if a company chooses. McLaughlin admits Clarke initially was worried drivers might take exception to being monitored, but instead, the drivers see it as a competition — who earns the best score or has the fewest infractions.

"It depends on how it's presented," he says.

The initial cost is between \$120 and \$150 per vehicle, depending on the number of vehicles receiving the devices. Monthly monitoring is \$35 a month per vehicle during peak season and \$7 per month per vehicle in the off-season. **PMP**

— **Dan Jacobs** | Contributor



Well-behaved women seldom make history.”

— Dr. Laurel Thatcher Ulrich,
Pulitzer-Prize-winning Professor of
early American history at Harvard University

The Mothers of Mosquito Management

Born in the late-1800s and early-1900s, five women overcame social stigmas to become pioneers in the mosquito management industry.

The prejudice against women in science is ancient. Aristotle, often cited as the father of science, said women didn't have the same mental acuity as men. That attitude hasn't entirely disappeared from even 21st century thought, according to Dr. Gordon Patterson, professor of history at the Florida Institute of Technology. In 2005, former Harvard President Dr. Laurence Summers resigned following comments he made about the ability of women and mathematics.

Today, the pest management industry has a number of high-profile women contributing in all areas. That couldn't always be said, but in the 19th and early 20th centuries, five women contributed significantly to advancements in mosquito management. They were, in large part, the mothers of the mosquito management industry.

“They conflated, they contradicted, they stood against the temper of their time,” Patterson says. “They stood against the current of their time and the belief that women couldn't serve in work.”

Carrie Bailey Aaron (1858-1954)

In 1890, Aaron was the winner of the Dr. Robert H. Lamborn Prize given to the most outstanding essay about mosquito management. Aaron was an illustrator who created more than 500 illustrations of spiders for entomologists. She also was one of the first members of the Entomological Society of America (ESA). At that time, it was widely believed dragonflies were a beneficial way to control mosquitoes. Aaron's winning essay explained why that wasn't a reasonable method and how she conducted her own series of experiments with containers of water and mosquito larvae.

Dr. Gordon
Patterson

Helene Trembley Durkee (1905-1983)

Durkee was an entomologist and associate editor of *Mosquito News*. She also was the author of the American Mosquito Control Association Bulletin 3 Mosquito Culture Techniques and Experimental Procedures (1955). She and her husband, who later died of malaria, spent time in Shanghai, China, to educate people about the importance of mosquito management.

Dr. Clara Southmayd Ludlow (1852-1924)

Ludlow was a taxonomist and lecturer in the the Army Medical Museum in Washington and ended up working with mosquitoes almost by accident. She spent time at the Mississippi Agricultural and Technical College (now Mississippi State University), where she convinced a professor to let her work on his investigation into yellow fever. She ended up in Manila, Philippines, where her brother, an army captain, convinced other officers to send her mosquito samples. Ludlow was known for her battle of wits with fellow entomologist Dr. Harrison Dyar, who wrote several pieces correcting the “little woman studying mosquitos” (sic). She wrote back stating if Dyar knew what he was talking about, people might listen to him.

Vida L. MacDonell (1886-1969)

Vida MacDonell was a civic leader, activist and the first woman to serve as president of the Florida Mosquito Control Association (FMCA). MacDonell was married to a young doctor who was sent to Florida for training for World War I. Their goal was to determine how to protect recruits from malaria. MacDonell worked with the Women's Club of Florida, which was interested in public health, along with the suffragette movement, to have the plan implemented. She was integral in getting the governor to sign the first mosquito abatement act.

“She didn't make the coffee; she didn't make the tea,” Patterson quips. “She stood, led and had a vision of what mosquito control should be.”

Ernestine Hogan Thurman-Swartzwelder (1920-1987)

Born in Arkansas, Ernestine Thurman-Swartzwelder spent time in California where she was in charge of leading ecological surveys. As a scientist and public health worker, she investigated malaria control in war areas and later worked for the National Institutes of Health. **PMP**

— Dan Jacobs | Contributor

Loud and Clear

How PMPs can voice their opinions during product registration.

Throughout the years, the pest management industry has lost many of its tools. The argument against those products usually referred to the risk potential they posed to humans, nontarget animals and the environment. But the question for pest management professionals (PMPs) is whether their voice was part of the decision-making process.



Current U.S. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) regulations require the review of each registered pesticide at least every 15 years to ensure each continues to meet safety standards, says Anita Pease, associate director of the Environmental Fate and Effects Division, Office of Pesticide Programs at the U.S. Environmental Protection Agency (EPA). Pease spoke at the American Mosquito Control Association (AMCA) annual conference held in Seattle last month.

Pease says that, to date, there are about 750 chemical cases comprising more than 1,100 active ingredients, and it takes five to seven years on average to review each case. The first 15-year cycle must be completed by Oct. 1, 2022, according to FIFRA. All reviews include national-level Endangered Species Act (ESA) Effects Determinations.

The stages of the review process are:

- focus meeting;
- open docket;
- preliminary risk assessment, which includes an informal ESA Consultation; and
- final risk assessment and proposed decision, which includes a formal ESA consultation.

At each stage of the review process, there's an opportunity for enhanced stakeholder input. The public input stage is where PMPs have the opportunity to share their thoughts. Public input is invited from all interested parties during:

- initial docket openings;
- significant risk assessments;
- all proposed decisions; and
- draft biological opinions.


For mosquito management, this input is vital to ensure assessment accurately reflects use. There's much relevant data that professionals can provide, including:

- **application method** – aerial, ground, truck, perimeter treatment, residential outdoor fogging/misters;
- **application frequency and interval** – typical vs. high-end exposure scenarios, especially for residential use;
- **application rate** – it's difficult to quantify some residential use rates in terms of model inputs (pounds of active ingredient per acre, for example);
- **application conditions** – wind speed, temperature, season, etc.;
- **geographic differences** – application methods might vary by region;
- **deposition rate** – what fraction of application rate is deposited on foliage/ground in and beyond the treatment area;
- **drift** – amount of pesticide drift off site;
- **follow-up** – monitoring data for pesticide runoff and surface water.

According to Pease, the participation from professionals would be most valuable during two stages:

- **work plan stage**, when label and use patterns will drive risk assessments; and
- **risk assessment stage**, when geographic locations of use and available monitoring data might refine endangered species assessment. **PMP**

— **Dan Jacobs** | Contributor

 To learn more about the registration review process, visit www.epa.gov/oppsrrd1/registration_review. Specific pesticide information is available at www.epa.gov/pesticides/chemicalsearch.



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